

BROWNS

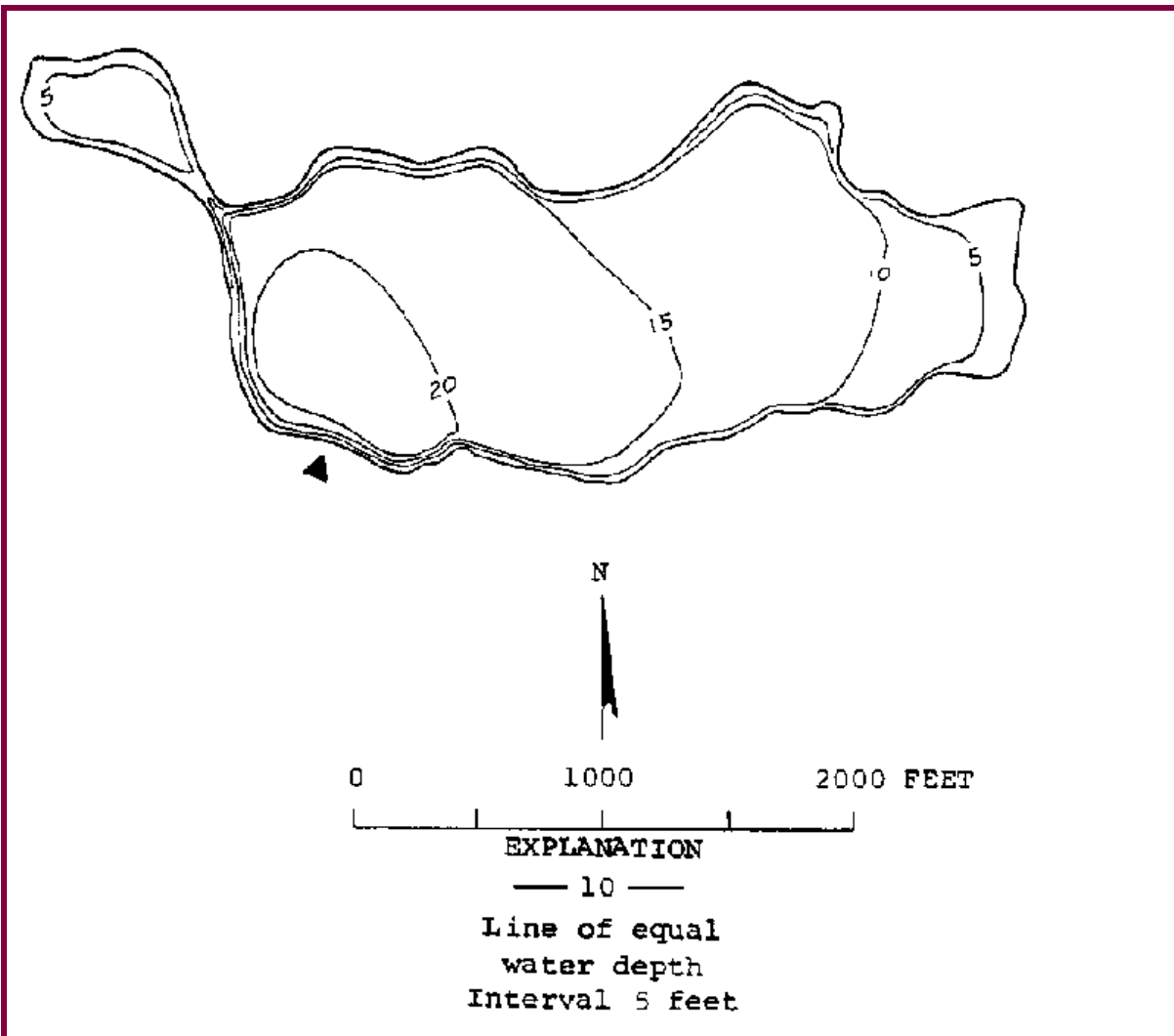
PEND OREILLE County

Lake ID: BROPE1

Ecoregion: 8

Browns Lake is located twenty miles north of the Washington-Idaho border town of Newport. It sits in the Colville National Forest. It is fed by a small tributary in the Pend Oreille River drainage.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
84	23	13	5	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
1085	2.06	3450	48 26 12.	117 11 25.



Station Information

BROPE1

Primary Station	Station # 1	latitude: 48 26 17.0	longitude: 117 11 46.0
Description: Deep part of lake, mid lake out from USFS campground access.			

Trophic State Assessment for 1999

BROWNS

Analyst: Sarah O'Neal

TSI_Secchi:	^a 33	B
TSI_Phos:	43	
TSI_Chlor:	33	
Narrative TSI:	^b OM	

Browns Lake was likely near its natural trophic state. Anthropogenic disturbance in the lake was limited to a US Forest Service campground and some logging in the watershed. No private development had occurred around the lake, and all motors were prohibited. Questionnaires indicated fly-fishing as the primary use. Questionnaire responses also indicated a desire to maintain the current motor restriction. WDFW stocked Browns Lake annually with approximately 20,000 cutthroat trout fry. The relatively cold and mostly oxygenated hypolimnion likely supported the trout. The lake's oligomesotrophic-mesotrophic state clearly supported fly-fishing and other uses, including canoeing, kayaking, and relaxing. Average phosphorus concentrations were higher than would be expected given transparency and chlorophyll averages. A possible cause was the widely fluctuating water level in the lake which may have increased the proportion of sediment-associated phosphorus that was not biologically available. There was no evidence of internal phosphorus loading.

Because uses were supported and the trophic state of the lake was natural, a total phosphorus criterion may be set at the seasonal mean established during 1999 sampling, adjusted for interannual variability. Therefore, we recommend a total phosphorus criterion for the lake of 18.8 ug/L total (mean 15.2 ug/L plus standard deviation of 3.6 ug/L). However, nitrogen concentrations were very low and TN:TP ratios indicate nitrogen limitation. Because the lake may be nitrogen limited, if the application of nitrogen-based fertilizers is to be part of silviculture operations in the watershed, extreme care should be taken to stay well back from the lake, tributaries, and nearshore areas and timing and buffer requirements should be strictly followed. Other nitrogen sources should similarly be kept away from the lake.

Mean Secchi = 6.4m; Mean TP = 15.2 ug/L; Mean Chl = 1.3 ug/L

^a TSI Qualifiers: B or W-Secchi Disk hit bottom or entered weeds; J-Estimate; N-Fewer than the required number of samples

^b E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

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Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 1										
6/15/1999	1130	E	17.7	.083	5	.65		7.44	2020	.7
		H	17.2	.083	5					
7/13/1999	1130	E	5.8	.095	16	.54				.6
		H	8.91	.103	12					
8/10/1999	1100	E	17.5	.073	4	.8				.5 U
		H	15.9	.107	7					
9/14/1999	1040	E	16.8	.112	7	2.6				.5 U

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Watershed Survey

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Survey Date: 9/14/1999

Land Uses (1 = Primary, 2 = Secondary, etc.)

☒ 2 Agriculture(commercial, not hobby)☐ Residential☐ Commercial, Industrial☒ 1 Park, forest or natural☐ Major transportation

Impervious surfaces (Roads and parking area): No Curbs

Observations (check mark denotes presence)

BMP's ☐Odors ☐Cattle ☐ Ducks ☒ Geese ☐

One

Fertilizers and weed killers appear to be used in residential or agriculture area ☐Buffer zones around streams and wetlands ☒

OK. Logging roads should be maintained or retired when not in use.

Irrigation ☐

Survey Id: 100

Habitat Survey Summary Report

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Data are averages of 10 Stations Surveyed

Date of Visit: 8/25/1999

Vegetation Type (Avg. only of sites w/ vegetation present; 1=coniferous, 3=deciduous)

Canopy Layer Avg:	1.2	Number of stations with canopy:	10
Understory Avg:	2.3	Number of stations with understory:	10

Percent Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

Canopy Layer:	trees > 0.3 m DBH	1.3
	trees < 0.3 m DBH	0.9
Understory:	woody shrubs saplings	1.8
	tall herbs, forbs grasses	1.1
Ground Cover:	woody shrubs seedlings	1.4
	herbs, forbs, grasses	1.7
	standing water or inundated veg	0.2
	barren or buildings	1.4
Substrate Type (within shoreline plot):	bedrock	0.0
	boulders	0.5
	cobble/gravel	2.2
	loose sand	1.3
	other fine soil/sediment	1.1
	vegetated	1.7
Bank Features:	other	0.1
	angle (0:<30; 1: 30-75; 2:nr vertical)	0.9
	vertical dist (M from wtrln to high wt):	2.0
	horiz. dist. (M from wtrln to high wt):	1.9

Human Influence (0 = absent, 1 = adjacent to or behind plot, 2 = present within plot)

buildings	0.0
commercial	0.0
park facilities	0.0
docks/boats	0.0
walls, dikes, or revetments	0.0
litter, trash dump, or landfill	0.0
roads or railroad	0.0
row crops	0.0
pasture or hayfield	0.0
orchard	0.0
lawn	0.0
other	0.0

Physical Habitat Characteristics

station depth (m; at 10 m from shore)	2.6
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Bottom Substrate (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

bedrock	0.0
boulders	0.1
cobble	2.3
gravel	2.7
sand	0.5
silt	1.0
woody debris	1.0

Macrophyte Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

submergent	1.5
emergent	0.5
floating	0.0
total weed cover	1.6

Do macrophytes extend lakeward (-1 = yes, 0 = no) -0.2

Fish Cover (0 = absent, 1 = Present but sparse, 2 = moderate to heavy)

aquatic weeds	1.2
snags	0.0
brush or woody debris	1.2
inundated live trees	0.0
overhanging vegetation	0.0
rock ledges or sharp dropoffs	0.0
boulders	0.1
human structures	0.0

Questionnaire

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Results compiled from 6 Surveys. Average time (years) respondents spent on lake: 8.33

Did the following add (+1), detract (-1), or have no effect (0) on your enjoyment of the lake today?

Types of WaterCraft:	0.8	View:	1.0	Distance to Lake:	0.5
Public Access:	0.2	Swim Beach:	0.0	Canada Geese:	0.0
Water Clarity:	0.8	Water Qual. for Swim:	0.2		
Fishing Quality:	0.7	Aquatic Plants:	-0.2		

On a scale of 1 (poor) to 5 (excellent), how would you rate water quality today? 3.5

Which would you rather have, 1 or 2?

1) Better fishing and more natural habitat, or 2) clearer water?	1.2
1) Better fishing and more natural habitat, or 2) fewer aquatic plants?	1.2
1) Clearer water, or 2) fewer aquatic plants?	1.2

How important is each of the following characteristics to you (1 = very undesirable, 5= very desirable):

Restricted Watercraft:	4.3	Good Warmwtr Fishing:	1.7	Natural Scenery:	4.7
Plant Growth:	2.5	Good Swimming:	3.3	Public Beach:	3.0

Natural Shoreline:	3.2	Less Algae:	3.7	Canada Geese:	2.7
No Odors:	4.2	Public Access:	3.7		
Good Coldwtr Fishing:	4.2	Clear Water:	4.2		

Tabulated Results

Survey ID	Date	-----Residency-----	Rent or Own	Primary Activity*	-----Water Clarity-----		
					Purchase Factor?	Has it Changed?	When?
90	7/31/1999	Visitor		1	<input type="checkbox"/>	Unknown	
92	7/16/1999	Visitor		2	<input type="checkbox"/>	No	
98	10/23/1999	Visitor		10	<input type="checkbox"/>	Unknown	
122	8/12/1999	Resident	Permanent	Rent	<input type="checkbox"/>	Worse	
134	7/16/1999	Visitor		2	<input type="checkbox"/>	Worse	1995
Campers leaving messes							
219	8/30/1999	Visitor		2	<input type="checkbox"/>	Unknown	
Camp host has done a superb job keeping the campground clean and orderly.							

* 1=canoe/kayak, 2=fish, 3=pers. wtrcft, 4=mtrboat, 5=sail, 6=swim/wade, 7=watch wldlf, 8=ski, 9=windsurf, 10=relaxing

Zooplankton Report

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Date 6/15/1999 Station: 1 Hundreds of rotifers.
Sample ID 26

Number of organisms measured: #Delet

Group	Percent	Group	Percent
Cladocera	#Deleted	Small < 1mm	#Deleted
Copepod	#Deleted	Large >= 1mm	#Deleted
Other	#Deleted	Ratio of large to Smal	#Num!
		Average size (mm):	0.73

Date 6/15/1999 Station: 1 Hundreds of rotifers and dense filamentous algae. 2nd count from one sample.
Sample ID 74

Number of organisms measured: #Delet

Group	Percent	Group	Percent
Cladocera	#Deleted	Small < 1mm	#Deleted
Copepod	#Deleted	Large >= 1mm	#Deleted
Other	#Deleted	Ratio of large to Smal	#Num!
		Average size (mm):	0.84

Date 8/10/1999 Station: 1
Sample ID 49

Number of organisms measured: #Delet

Group	Percent	Group	Percent
Cladocera	#Deleted	Small < 1mm	#Deleted
Copepod	#Deleted	Large >= 1mm	#Deleted
Other	#Deleted	Ratio of large to Smal	#Num!
		Average size (mm):	0.60

Aquatic Plant Data

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Sampler: Parsons, O'Neal

Survey Date: 8/25/1999

Max depth of growth (M): ?

Comments Partly cloudy, breezy. Water level down about two meters, fly fishing only. Some floating mats of Elodea. Most of plant growth at east end, the rest of the lake with steep rocky shoreline. Plants in these areas growing below ~ 2 m deep. Did habitat survey.

SPECIES LIST

Scientific Name	Common Name	Dist ^a	Comments
<i>Elodea canadensis</i>	common elodea	3	most prevalent plant
<i>Fontinalis antipyretica</i>	water moss	1	
<i>Isoetes</i> sp.	quillwort	2	
<i>Juncus</i> sp.	rush	2	along shore
<i>Mentha</i> sp.	mint	2	along shore
<i>Potamogeton epihydrus</i>	ribbonleaf pondweed	2	at east end
<i>Potamogeton gramineus</i>	grass-leaved pondweed	2	at east end
<i>Potamogeton</i> sp (thin leaved)	thin leaved pondweed	2	at east end
<i>Ranunculus aquatilis</i>	water-buttercup	2	at east end
<i>Ranunculus flammula</i>	creeping buttercup	2	in shallows, blooming above receding waterline

^a 0 - value not recorded (plant may not be submersed)

2 - few plants, but with a wide patchy distribution

4 - plants in nearly monospecific patches, dominant

1 - few plants in only 1 or a few locations

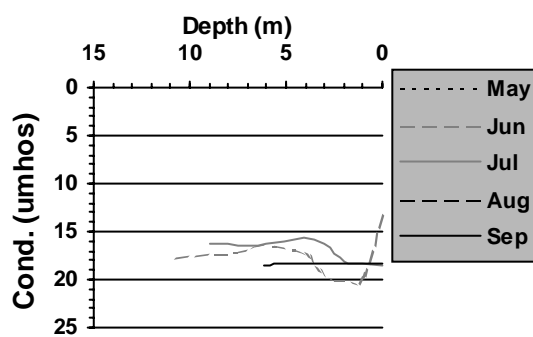
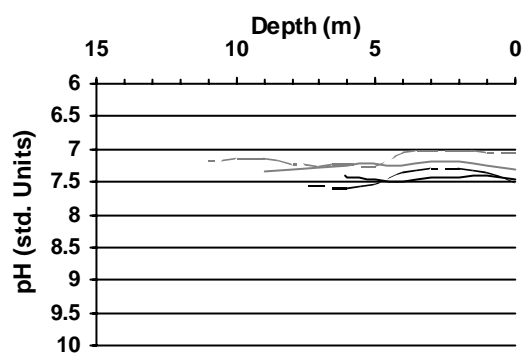
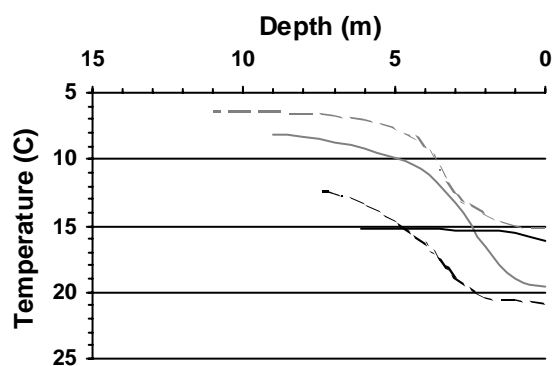
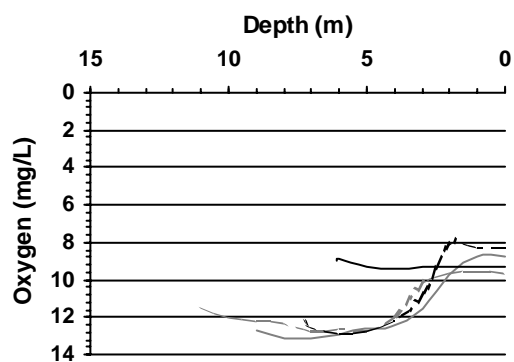
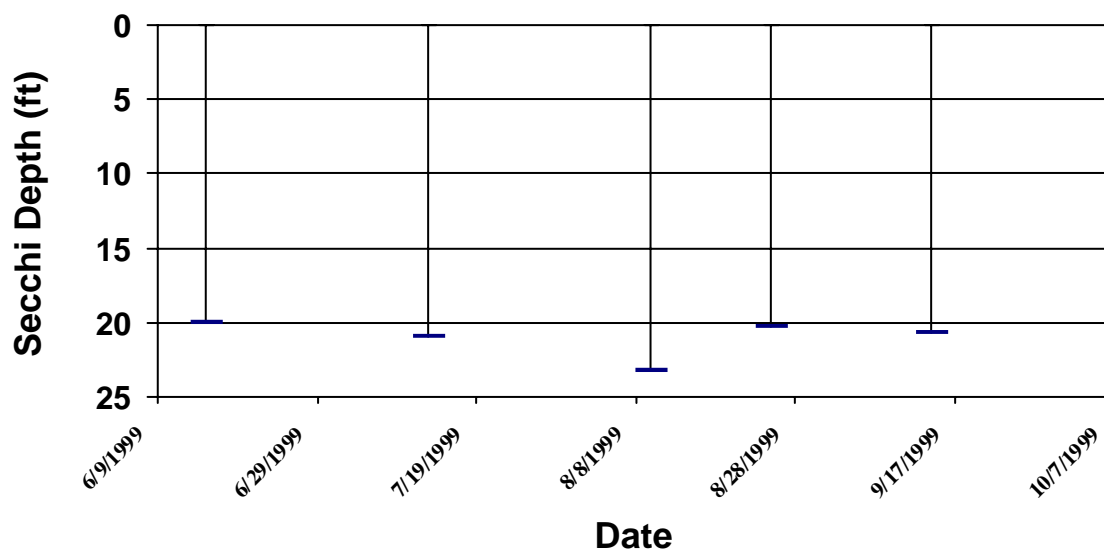
3 - plants in large patches, codominant with other plants

5 - thick growth covering substrate to exclusion of other species

Secchi Depth and Profile Graphics

Station: 1

BROPE1



Secchi Data and Field Observations

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Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/15/1999			20	2	0	3	1	5	5	0	0	4	0
	Sampler: HALLOCK			Remarks: Bottom 11.0M. Water is clear and clean with some possible Volvox. Level is very high (5ft above base of a cottonwood near launch). No motors permitted. USFS campground only development. Two fishermen said they usually get RBT but cutthroat this year. Dissolved oxygen measurement qualified as an estimate due to calibration failing QA/QC requirements.									
7/13/1999			21	3	0	2	1	5	5	0	0	4	0
	Sampler: HALLOCK			Remarks: Sounds of logging in watershed. Water still high. Signs of crayfish. Dissolved oxygen measurement qualified as an estimate due to calibration failing QA/QC requirements.									
8/10/1999			23.3	4	0	1	1	4	4	0	0	10	0
	Sampler: HALLOCK			Remarks: Bottom 7.4M. Small Gloeotrichia-like specks. Lake level down several feet from last month. Plant fragments floating throughout lake (Elodea and Ranunculus). Dissolved oxygen measurement qualified as an estimate due to calibration failing QA/QC requirements.									
8/25/1999			20.34										
	Sampler: Parsons			Remarks:									
9/14/1999			20.7 B	2	0	2	1	4	4	0	6	1	0
	Sampler: HALLOCK			Remarks: Bottom 6.1M. Secchi disk hit bottom. Elodea and Nitella came up on anchor. Water level ~15ft below high water mark on trees. Lots of small (1.5cm) brown/black frogs. Gloeotrichia present. Not stratified.									